



GRACIOSA ISLAND GRID

Grid control, integration and optimisation

Heavy dependence on fossil fuel imports, coupled with a growing climate crisis, puts islands around the globe in a very unique bind as it relates to energy security. Relying on oil, diesel and natural gas shipments has been a very expensive endeavor and traditionally the only option for these isolated communities. That is until now. Integrating renewable energy has not only become an economically viable alternative, it's also a sustainable one.

On the path to 100% renewable energy via grid control, integration and optimisation

Graciosa, a Portuguese territory located in the northern Azores, is one of many islands pursuing a hybrid approach to island grid energy generation, combining wind, solar, energy storage and thermal generation.

Led by Graciolica Lda, the project combines solar and wind generation, together with energy storage using lithium-ion batteries supplied by Leclanché SA. This project represents the journey towards a 100% renewable energy future with an integrated power system combining renewables, engines and energy storage that will deliver both economic and environmental benefits.

A solution for an islanded grid

Supplying energy for an entire island community entails a unique skillset beyond simply connecting inverters and batteries—which is why Graciolica Lda engaged Wärtsilä. Leveraging the industry-leading GEMS energy management platform, the island grid of Graciosa addresses baseload supply requirements while accommodating fluctuations in output that are inherent to energy supplied from renewable sources, such as solar and wind.

“Our investment helps create a renewable energy asset that will deliver both economic and environmental benefits. This project represents the future direction of the global energy sector with an integrated power system combining renewables and energy storage. We appreciate Wärtsilä’s professionalism in providing the software needed to expand the functionality of the microgrid to create overall system reliability and performance.”

*Scott Macaw, Director,
Graciolica Lda*



The optimisation and monitoring capabilities of the GEMS platform will maximise the performance and longevity of the Graciosa energy system. Data inputs from Supervisory Control and Data Acquisition (SCADA), electric meters, heating, ventilation and air conditioning, as well as weather forecasts are evaluated within GEMS for optimal energy distribution. The relationship does not stop at the deployment. Wärtsilä has also provided software maintenance services under a five-year agreement.

A path to energy independence

The Graciosa Hybrid Renewable Power Plant will enable 1.0 MW of solar, 4.5 MW of wind power and 6.0 MW / 3.2 MWh energy storage system supplied to the local grid, reducing the islands’ reliance on petroleum imports and significantly reducing greenhouse gas (GHG) emissions.

Graciosa Lda’s end client, local utility EDA, anticipated that this investment would boost renewable energy consumption from 15% to 65%; and the project has done just that, with more than 52 days running at 100% renewable energy in the first year of operation.

Not only does this reduce the island’s carbon footprint, but the hybrid island grid also reduces the cost of energy for the island and its customers going forward.

THE CHALLENGE	WÄRTSILÄ’S SOLUTION	BENEFIT
<ul style="list-style-type: none"> Heavy dependence on external sources for energy fuel, including high costs of importing fossil fuels to power the island’s energy grid and relative unreliability of supplies 	<ul style="list-style-type: none"> Hybrid storage solution integrated and GEMS optimised energy generation, combining wind, solar, energy storage and thermal generation assets 	<ul style="list-style-type: none"> Reduced island’s reliance on imported fossil fuels and significantly cut down on greenhouse gas emissions by boosting renewable energy consumption from 15% to 65%

CUSTOMER: Graciosa Lda
SITE SIZE: 1.0 MW of solar, 4.5 MW of wind power and 6.0 MW / 3.2 MWh energy storage system
SITE LOCATION: Azores, Portugal
APPLICATION: Renewables integration Island Grid+
OPTIMISATION: Engine and battery economic dispatch. Renewable curtailment. Engine operating constraints. Grid quality and spinning reserve requirements.

RELATED RESOURCES

- [Wärtsilä smart storage technology](#)
- [GEMS Power Plant Controller](#)
- [Island Grid+ Solution](#)
- [Article: Graciosa on the path to 100% renewable energy](#)
- [Article: Learning curves – How software and storage are powering a renewable future](#)

wartsila.com/energy

© 2021 Wärtsilä Corporation – All rights reserved.
 No part of this publication may be reproduced or copied in any form or by any means (electronic, mechanical, graphic, photocopying, recording, taping or other information retrieval systems) without the prior written permission of the copyright holder. Neither Wärtsilä Finland Oy, nor any other Wärtsilä Group Company, makes any representation or warranty (express or implied) in this publication and neither Wärtsilä Finland Oy, nor any other Wärtsilä Group Company, assumes any responsibility for the correctness, errors or omissions of information contained herein. Information in this publication is subject to change without notice. No liability, whether direct, indirect, special, incidental or consequential, is assumed with respect to the information contained herein. This publication is intended for information purposes only.

